

Authors

F. E. Allen

Research Division, Yorktown Heights, New York

Ms. Allen is a research staff member in the Computer Sciences Department at the Thomas J. Watson Research Center. She joined IBM in the Research Division in 1957. After developing an early IBM operating system, she became interested in languages and compilers and has remained in that area since. Ms. Allen received a B.A. in mathematics from the State University of New York at Albany and an M.A. in mathematics from the University of Michigan. Ms. Allen is a member of the Association for Computing Machinery and has been an ACM national lecturer, an Institute of Electrical and Electronics Engineers distinguished visitor, a member of the National Science Foundation's computer science advisory board, and a consulting professor at Stanford University.

Jose Luis Becerril

IBM Spain, Madrid Scientific Center

Mr. Becerril graduated from the University of Zaragoza, Spain, in 1968, with a major in physics. He lectured on quantum mechanics at the University of Madrid, Spain, from 1968 to 1974. In 1973 he joined the Autonomous University of Madrid—IBM Scientific Center, where he has been involved in formal languages, data bases, programming theory, and graphics.

Jose Bondia

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Mr. Bondia received a degree in mathematics from the University of Madrid, Spain, in 1973. He joined IBM in 1974 as a systems engineer at the Madrid Scientific Center. He has been involved in programming theory, formal languages, and operating systems.

Dennis Boyle

IBM Information Services Limited, Portsmouth, England

Mr. Boyle is a staff programmer at IBM Information Services Limited. He is currently a member of a team working on the development of a systems environment for applications using the Information Management System. Mr. Boyle joined the IBM systems education department at Sudbury, England, in 1969, where he was engaged principally in the development of programming language courses. He moved to the Program Product Centre, Croydon, in 1973 to take up work on the design and development of program products. From 1975 to 1979 he was on assignment at SCD Kingston, New York, to work on the development of the PL/DS compiler. Mr. Boyle obtained a degree in chemistry from the University of Manchester, England, in 1962 and the Post Graduate Certificate of Education from the University of London in 1964.

J. Lawrence Carter

Research Division, Yorktown Heights, New York

Dr. Carter joined IBM's Research Division at the Thomas J. Watson Research Center in 1965, after receiving his Ph.D. in mathematics from the University of California at Berkeley. His current work is with the theory of programming, but he was with the experimental compiler project until he took a sabbatical leave to Pennsylvania State University last year. Dr. Carter is a member of the Association for Computing Machinery.

Ramon Casajuana

IBM Spain, Madrid Scientific Center

Dr. Casajuana is a member of the Computer Science Department at the Autonomous University of Madrid—IBM Scientific Center. He has worked in compiler and interpreter design, programming theory, graphics, and relational data bases. He received his doctorate in physics from the University of Sevilla, Spain, in 1971. Prior to joining IBM in 1974, he did postdoctoral work in digital techniques at the Philips International Institute in Eindhoven, The Netherlands.

John Cocke

Research Division, Yorktown Heights, New York

Dr. Cocke received a B.S. in mechanical engineering in 1946 and a Ph.D. in mathematics in 1956, both from Duke University. In 1956 he joined IBM in the Research Division and is currently associated with both the Thomas J. Watson Research Center and Corporate Headquarters, where he is a member of the Corporate Technical Committee. His main research interest has been in systems architecture, particularly hardware design and program optimization. Dr. Cocke is an IBM Fellow and has been a visiting professor at the Massachusetts Institute of Technology and at the Courant Institute of Mathematical Sciences, New York University. He is a member of the National Academy of Engineering.

Norbert J. Denil

General Systems Division, Atlanta, Georgia

Dr. Denil is a senior analyst in application development. He is currently engaged in developing programming tools to be used in producing application products. After managing an application programming group in the Cadillac Division of General Motors, he joined IBM in 1963 in the Advanced Systems Development Division. His primary interests have been in graphics, computer-aided design, and development of languages for programmers and end-users. These were pursued in various assignments in the Systems Development and Research Divisions. He was a member of the Computer Sciences Department at the Thomas J. Watson Research Center from 1969 until he joined the General Systems Division in 1979. Dr. Denil received the B.M.E. degree from General Motors Institute in Flint, Michigan, in 1956. He attended the Massachusetts Institute of Technology under the IBM Resident Study Plan, where he received the S.M. degree in 1967 and the Sc.D. degree in 1969.

Janet Fabri

Deceased

Dr. Fabri was a research staff member at the Thomas J. Watson Research Center working on the experimental compiling system constant propagator and on automatic storage optimization. She joined IBM in 1964 at the New York Programming Center in New York City and worked there for ten years on projects relating to compilers and operating systems, including a number of PL/I advanced technology efforts. In 1974, she took an educational leave of absence. Returning in 1977 to the network analysis department in Corporate telecommunications, she developed an integrated network optimizer. In 1979, she joined the experimental compiling system project at Research. Dr. Fabri received her B.A. from Barnard College of Columbia University in 1960 and her M.S. and Ph.D. degrees from the Courant Institute of Mathematical Sciences at New York University in 1974 and 1979.

Jeanne Ferrante

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Dr. Ferrante is currently a research staff member working on the experimental compiling system project at the Thomas J. Watson Research Center. Her work on the project has been in data flow analysis and optimization. She joined IBM at Research in 1978. Previously she taught mathematics and computer science at Tufts University, Medford, Massachusetts, and worked in the area of computational complexity. She received a B.A. in natural science in 1969 from New College at Hofstra University, Hempstead, New York, and in 1974 a Ph.D. in mathematics from the Massachusetts Institute of Technology. In 1979 she published a volume in the Springer-Verlag Lecture Notes in Mathematics with Charles Rackoff entitled *The Computational Complexity of Logical Theories*.

William H. Harrison

Research Division, Yorktown Heights, New York

Mr. Harrison received the B.S. in electrical engineering from the Massachusetts Institute of Technology in 1968, the M.S. from Syracuse University in 1973, and the M.Ph. from Syracuse University in 1979. While associated with the Systems Development Division of IBM from 1966 to 1970, he worked on FORMAC, a system for algebraic manipulation, on the design and implementation of an experimental time-sharing system for building large programming systems, and on the design of the OS/360 Time Sharing Option. Since 1970, he has been associated with the Thomas J. Watson Research Center. During this time he has participated in the design of a language with extensible and highly structured data types and has consulted with the Systems Development Division on the formal definition of advanced systems. He is currently manager of the experimental compiling system project, investigating experimental techniques for program analysis and optimization and for compiler organization. He received an IBM Invention Achievement Award and an IBM Outstanding Contribution Award for his work on the IBM OS/360 Time Sharing Option. Mr. Harrison is a member of the Association for Computing Machinery, the Institute of Electrical and Electronics Engineers, and Sigma Xi.

Harwood G. Kolsky

Data Processing Division, Scientific Center, Palo Alto, California

Dr. Kolsky, an IBM Fellow, is located at the Palo Alto Scientific Center. He is a physicist who has been involved in a variety of projects including programming languages, scientific applications, and digital image processing. After seven years at the Los Alamos Scientific Laboratory, he joined IBM in 1957 in Poughkeepsie, New York. In 1959 he became assistant manager of the Federal Systems Division office in Omaha, Nebraska. Following this he spent some time at FSD headquarters, before being named manager of the Systems Science department at the San Jose Research laboratory in 1961. In 1962 he headed an advanced technology group in the Advanced Systems Development Division at Los Gatos, California. He joined the Palo Alto Scientific Center, when it was formed in 1964, as manager of the atmospheric physics group. In 1968 he was named a consultant and in 1969 an IBM Fellow. He served on the Corporate Technical Committee at Corporate Headquarters from 1974 to 1975. Dr. Kolsky received his B.S. in physics from the University of Kansas in 1943 and his Ph.D. in physics from Harvard University in 1950. Dr. Kolsky is a member of the American Physical Society, the Association for Computing Machinery, the Institute of Electrical and Electronics Engineers, and Sigma Xi.

Juan M. Lafuente

Research Division, Yorktown Heights, New York

Dr. Lafuente is a member of the research staff at the Thomas J. Watson Research Center, where he is currently working on a system for automated fabrication of microdevices using electron-beam lithographic methods. He joined IBM in 1962 at the Poughkeepsie laboratory where he worked on computer-aided design, computer graphics, and problem-oriented languages. From 1976 to 1978, he worked in a compiler development group in IBM Poughkeepsie. From 1973 to 1976 he worked at the Mohansic laboratory on the design and implementation of interactive language facilities for use by nonprogrammers. Dr. Lafuente received the B.S. in mechanical engineering in 1961 from Tulane University, New Orleans, Louisiana, and the M.S. in mechanical engineering in 1962 from Louisiana State University. In 1968 he obtained an M.S. in applied mathematics from New York University. He attended Cornell University from 1969 to 1972 on an IBM resident graduate fellowship and specialized in programming language semantics and compiler design. He received his Ph.D. in computer science from Cornell in 1977. Dr. Lafuente is a member of the Association for Computing Machinery.

Paul G. Loewner

Research Division, Yorktown Heights, New York

Mr. Loewner is a research staff member in the Computer Sciences Department, where he is working on compiler construction, including constant propagation. Mr. Loewner joined the Service Bureau Corporation (then a subsidiary of IBM) in 1958 and the Research Division in 1967. Previously he worked on graphics for speech recognition system, Radix exchange sort with look-ahead, APL vs PL/I interfacing problems, an interactive debugging system, and a generalized inter-program binding system. Mr. Loewner was a mathematician and programmer for Boeing Aircraft and North American Aviation from 1954 to 1957. He studied mathematics at Syracuse University from 1948 to 1951; at Stanford University from 1951 to 1953, receiving his B.S. with Distinction in 1952 and his M.S. in 1953; at the Uni-

versity of California at Berkeley from 1953 to 1955; and at the Courant Institute of Mathematics, New York University, from 1958 to 1960. Mr. Loewner is a member of the American Mathematical Society, the Association for Computing Machinery, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics.

David B. Lomet

Research Division, Yorktown Heights, New York

Dr. Lomet joined IBM at the Federal Systems Division in the Washington, DC, area. He subsequently won an IBM Resident Graduate Fellowship and attended the University of Pennsylvania, receiving a Ph.D. in computer science. Upon graduating, he joined the Research Division, where he has pursued research in programming languages, machine architecture, and data base systems. He spent the 1975-1976 academic year doing research on multiprocess programming and software reliability at the University of Newcastle upon Tyne, England. His current research interests are strategies for coping with deadlock and search techniques for large indexed data files. He is in the automatic programming group at the Thomas J. Watson Research Center. Dr. Lomet has a B.S. from Lafayette College, Easton, Pennsylvania, and an M.S. from George Washington University. He is a member of the American Association for the Advancement of Science, the Association for Computing Machinery, the Institute of Electrical and Electronics Engineers, and Phi Beta Kappa.

Edward A. MacNair

Research Division, Yorktown Heights, New York

Mr. MacNair has been a research staff member in the Computer Sciences Department at the Thomas J. Watson Research Center since 1973. He is currently in the performance modeling methodology group developing modeling programs to solve extended queuing networks. In addition, he is an adjunct staff member at the IBM Systems Research Institute, teaching courses related to systems performance evaluation. He joined IBM in 1965 at the Service Bureau Corporation (then a subsidiary of IBM) in New York City. In 1970, he transferred to IBM World Trade Headquarters in New York City, where he designed and implemented management information systems. He received a B.A. in mathematics in 1965 from Hofstra University and an M.S. in operations research in 1972 from New York University. He received a Research Division Outstanding Contribution Award for his involvement with the research queuing package, a tool for the solution of generalized queuing networks. Mr. MacNair is a member of the Association for Computing Machinery.

Brian Lawton Marks

System Communications Division, Hursley, England

Dr. Marks joined IBM in 1963 and worked on the development of the PL/I language. Following a period experimenting with aids to program debugging, he became project manager for the PL/I checkout compiler from 1968 to 1971. He is now working in advanced display technology with interests in cross-compiling and data compression. Before joining IBM, he worked at the Royal Aircraft Establishment, Farnborough, England, doing operations research as applied to runway utilization. Dr. Marks received the B.Sc. in mathematics in 1958 and the Ph.D. in mathematical statistics in 1960, both from Imperial College, London, England.

Peter W. Markstein

Research Division, Yorktown Heights, New York

Dr. Markstein is a research staff member in the Computer Sciences Department at the Thomas J. Watson Research Center, where his current area of research is compiler optimization techniques. He joined IBM at Research in 1959. In 1961, he designed and developed an experimental multiprogramming system for the STRETCH computer. In 1963, he worked on automatic code conversion from second-generation computers to System/360. He managed the Computing Center at the Thomas J. Watson Research Center and directed its system programming activities until 1970. From 1972 to 1975 he participated in a study of operating system security. Dr. Markstein received his Ph.D. in computer science from the Courant Institute of Mathematics, New York University, in 1975. He received IBM Outstanding Contribution Awards for his work on automatic code conversion and compiler optimization. Dr. Markstein is a member of Sigma Xi.

Paul Mundy

System Communications Division, Hursley, England

Mr. Mundy is a project manager in the customer information control system development group at Hursley. He joined IBM at Hursley in 1967 and worked in PL/I compiler development until 1972, when he transferred to the Program Product Centre, Croydon, England. During 1974 he was assigned to the Distribution Industry Centre in Paris and from 1975 to 1979 was assigned to the Kingston laboratory to work on the development of the PL/DS compiler. In 1979 he received an IBM Outstanding Innovation Award for his work on PL/DS. Mr. Mundy has a B.Sc. degree from St. Andrews University, Scotland.

Silvio Salza

Centro di Studio dei Sistemi di Controllo e Calcolo Automatici del Consiglio Nazionale delle Ricerche, Rome, Italy

Dr. Salza was a member of the system analysis and algorithms group at the IBM Thomas J. Watson Research Center, being mainly concerned with computer system performance evaluation. He has returned to Centro di Studio dei Sistemi di Controllo e Calcolo Automatici, where he has been working since 1974. Dr. Salza received a Dr. Ing. degree in electronic engineering from the University of Rome, Italy.

Charles H. Sauer

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Dr. Sauer has been a research staff member at the Thomas J. Watson Research Center since 1975. His current work is on performance modeling methodology and software. He received his B.A. in mathematics and his Ph.D. in computer science from the University of Texas in 1970 and 1975. From 1977 to 1979 he was an Assistant Professor of Computer Science at the University of Texas at Austin, while on leave of absence from IBM. Dr. Sauer has recently completed a textbook, *Computer System Performance Modeling: A Primer*, co-authored by K. M. Chandy. He has received an IBM Outstanding Innovation Award for creation and basic design of the Research Queuing Package (RESQ). Dr. Sauer is a member of the Association for Computing Machinery.

Randolph G. Scarborough

Data Processing Division, Scientific Center, Palo Alto, California

Mr. Scarborough is a programmer staff member at the Palo Alto Scientific Center on the IBM Fellow program. He joined IBM in 1969 as a systems engineer at the Trenton, New Jersey, branch office. While there he worked on several large scientific accounts and state government accounts. In 1973 he came to the Scientific Center to work on an APL microprogramming project. Since then he has worked on a variety of projects mostly in APL and FORTRAN. Mr. Scarborough received a B.A. from Princeton University in 1968. He has received nine IBM awards including an Outstanding Innovation Award for his work on the Fortran H Extended Optimization Enhancement. Mr. Scarborough is a member of the Association for Computing Machinery.

Thomas M. Spence

System Communications Division, Kingston, New York

Mr. Spence is an advisory programmer working in a department responsible for establishing microcode development tools. His particular interests include languages and the portability of microcode across machines. Mr. Spence joined IBM at Poughkeepsie, New York, as a junior engineer in 1956. He worked on logic design for a tape control unit for the IBM 709, in the area of design automation from 1957 to 1970 developing programs to check, simulate, and package logic designs, and on a microcode support system. Mr. Spence also worked on a compiler used to develop system code for the IBM System/370 and on a data base system to support the development of large software projects.

In 1976 he transferred to Kingston and joined his present department. In 1979 he was a co-recipient of an IBM Outstanding Innovation Award for work on an optimizing compiler. Mr. Spence received a B.S.E. from Princeton University in 1956.

Louise H. Trevillyan

Research Division, Yorktown Heights, New York

Ms. Trevillyan joined IBM in 1974 in the Data Processing Division in San Francisco. She moved to the Research Division in 1977 to work on the experimental compiling system project. Ms. Trevillyan received a B.A. in mathematics in 1968, an M.A. in mathematics in 1970, and an M.S. in computer science in 1970 from the University of Michigan. Prior to joining IBM, she worked at the University of Michigan Medical Center from 1971 to 1974.

Francisco Valer

IBM Spain, Madrid Scientific Center

Mr. Valer received a degree in physics from the Autonomous University of Madrid, Spain, in 1973, and in economic sciences from the Complutense University of Madrid, Spain, in 1974. He joined IBM in 1975 as a member of the Autonomous University—IBM Scientific Center. His professional experience has been related to numerical analysis, programming theory, graphics, and data bases.